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# Customer knowledge transfer challenges in a co-creation value network: Toward a reference model

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ABSTRACT

In today's interconnected global marketplace, where customers have become increasingly knowledgeable and empowered, a customer-centric view is becoming a prominent differentiating strategy for firms. Accordingly, firms with the aim of delivering a seamless customer experience strive to offer integrated solutions. This quite often relies on inter-organizational collaboration in the context of a value network In this context, customer-related knowledge is regarded as one of the primary sources in the provisioning process of integrated solutions. This, in turn, implies the importance of effective sharing of customer knowledge among actors of a value network.

Customer knowledge transfer is difficult due to some recognizable challenges such as a lack of trust. Because of the added complexity of a value network, achieving a shared understanding among actors about customer knowledge transfer challenges in a value network setting (VN-CKTC) might be more difficult. A systematic and comprehensive overview of the VN-CKTC (in the form of a reference model) might support this by providing additional structure.

Although scholars have long studied knowledge transfer challenges within business network settings, they are usually limited in scope and their resulting challenges differ widely. Therefore, they provide insufficient coverage of the possible challenges. A more comprehensive view is thus needed. Our research aims at designing and validating a reference model that provides a systematic and wider spectrum of possible VN-CKTC. To this end, a design science research approach is followed. In the design phase, by conducting a systematic literature review followed by a structured classification, a reference model of VN-CKTC is designed. In the evaluation phase, the validation of this designed artifact is evaluated in a value network setting by conducting multiple case studies. The results of this study give us both theoretically and context-specific descriptions of the significant relevant of these challenges.

The proposed reference model provides a rich picture of VN-CKTC. Decision makers of value networks can use this reference model as a means to achieve a shared understanding about customer knowledge transfer challenges and to come to an agreement on these challenges. They can also apply it to be aware of which challenges to focus on, so they are provided with a much stronger basis to make better-informed decisions to address and mitigate these challenges.

## 1. Introduction

Value co-creation through business networking has attracted increasing interests in different industrial sectors in which the design and delivery of integrated solutions for the customers is the central point (Chuang & Lin, 2015; Frow et al., 2014). Value co-creation is based on a customer-centric view on collaboration with the aim of delivering a seamless customer experience (Chuang & Lin, 2015; Hakanen & Jaakkola, 2012; Johannessen & Olsen, 2010). Integrated solutions refer to a customized bundle of products and services which are jointly provided by multiple actors to offer unified responses to customer problems (Hakanen & Jaakkola, 2012; Johannessen & Olsen, 2010). Integrated solutions provision is a complex and knowledge-intensive process which is often beyond the capability of an individual firm (Frow et al., 2014). It thus drives the formation of a co-creation value network. It refers to a business network of autonomous actors (e.g., service providers, customers) with heterogeneous operating environments and diverse interests, dynamically collaborating and jointly creating mass

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customized integrated solutions (Hakanen, 2014; Lusch, Vargo, & Tanniru, 2010). In the context of value networks, each actor focusses on its core competencies and works with others to access and integrate the complementary resources required for co-creating integrated solutions (Lusch et al., 2010; Rehm, Goel, & Junglas, 2016).

The integrated solution provision process starts from understanding the customer regarding problems, value creation process, and the context of use. Here customer-related knowledge is imperative for such an understanding (Ballantyne & Varey, 2006; Ojasalo, Koskelo, & Nousiainen, 2015; Payne, Storbacka, & Frow, 2008). Prior studies suggest that customer knowledge transfer among actors enables a better understanding of customer needs, which in turn leads to improved integrated solutions offerings (Ballantyne & Varey, 2006; Chuang & Lin, 2015; Hakanen, 2014; Trkman & Desouza, 2012). Such knowledge transfer is also required for creating and using network-level knowledge which is beyond the boundaries of an individual actor (Trkman & Desouza, 2012). Customer knowledge transfer within a value network refers to multidirectional sharing of customer-related knowledge relevant to integrated solution provision processes among actors (Bagheri, Kusters, & Trienekens, 2015).

Despite the many substantial benefits claimed for sharing knowledge in network settings, it is a difficult task. This may be due to a variety of challenges such as power asymmetry (Kembro, Näslund, & Olhager, 2017), lack of trust among actors (Nidhra, Yanamadala, Afzal, & Torkar, 2013; Pirkkalainen & Pawlowski, 2014), and fear of losing competencies (Zahedi, Shahin, & Babar, 2016). The term challenge refers to "any barrier, issue, difficulty, obstacle, or problem that might prevent or hinder a single person, a group, an organization, or a network of firms from reaching an objective and achieving success in a specific context, when the challenge is related to acting or working in a collaborative cross-border setting" (Pirkkalainen & Pawlowski, 2014).

Furthermore, the situation of a value network is often more complex in comparison to the other types of business networks (due to, for instance, lack of a central decision maker, dynamic collaboration, interdependence, coordination, and diversity of interests and backgrounds of the heterogeneous actors) which might lead to increased relational, behavioural as well as structural difficulties (Bertoni & Larsson, 2010; Camarinha-Matos, 2014; Kembro et al., 2017). Due to this added complexity, achieving a shared understanding among actors about customer knowledge transfer challenges in a value network setting (VN-CKTC) might even be more difficult. This shared understanding about VN-CKTC is essential otherwise, because of different expectations and communication gaps, value network actors may have perceptual differences on VN-CKTC which in turn may result in different actions to address such challenges (Ghobadi & Mathiassen, 2016; Trkman & Desouza, 2012). A systematic and comprehensive overview of the VN-CKTC (in the form of a reference model) might support this by providing additional structure.

In general, a reference model is a generic abstract conceptual framework that describes essential elements of a particular domain that helps to establish a common understanding about that domain, and that can be used as a reference for the development of specific models (Ahlemann, 2009; Frank, 2007; Thomas, 2005). A reference model has advantages such as:

1) It can be used as a template to facilitate communication (Ahlemann, 2009; Frank, 2007; Reinhartz-Berger, Soffer, & Sturm, 2010).
2) It assists in creating a shared understanding (Frank, 2007).

Although prior studies have studied knowledge transfer challenges within a business network setting, they are limited in scope and their resulting challenges differ widely (Hicks, Culley, & Mcmahon, 2006; Pirkkalainen & Pawlowski, 2014; Trkman & Desouza, 2012; Zahedi et al., 2016). Therefore, there is little agreement among existing works leading to a fragmented picture on potential relevant challenges (more detailed information is available in Sections 2 and 5). An integrated view that covers potential relevant challenges more systematically is thus required. For this, in this research, we suggest systematically identifying and classifying relevant challenges from literature. We opted to use a systematic literature review because it enables a more reliable systematic search for qualified information (Tranfield, Denyer, & Smart, 2003).

The objective of this study is to design and validate a reference model of VN-CKTC which by providing a systematic view on the relevant challenges aims to facilitate creating a shared understanding about VN-CKTC among actors of a value network. To this end, we are following a design science research approach (Hevner, March, Park, & Ram, 2004; Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007). In the design phase, by conducting a systematic literature review, followed by a structured classification, the VN-CKC reference model is designed. In the evaluation phase, the validation of this designed artifact is done in a value network setting by conducting multiple case studies.

This study contributes to the literature on knowledge transfer challenges in a value network setting in twofold. Firstly, following a well-structured methodology, this VN-CKTC reference model provides a systematic view of the various kinds of customer knowledge transfer challenges within a network setting. Secondly, in the evaluation phase besides validation of this reference model, arguments of a representative actor of eight value networks about the relevance and importance of these challenges in real-life value network settings, based on their experiences, brings additional insights on such challenges in the complex situation of value networks.

The outline of the paper is as follows. Section 2 provides an overview of the research background. The research methodology is described in Section 3. Section 4 presents the research results. Discussion on the research results and limitations and implication for practice and research is given in Section 5. Finally, the conclusions and future work are presented in Section 6.

## 2. Related work

In this section, we provide an overview of the state of the art related to this paper. We look at knowledge transfer challenges in business network settings in general and in a value network setting in particular. The term "business network," refers to a set of autonomous and interdependent business organizations that engage in collaboration to achieve a specific business goal (Grefen et al., 2018).

The importance of knowledge transfer has been emphasized in a value network setting (Grönroos, 2004; Matthyssens & Vandenbempt, 2008; Ranjan & Read, 2016). Recently Bertoni and Larsson (2010) through a case study has identified seven individual-related challenges (e.g., trust and awareness) relating to knowledge sharing among design teams involved in developing integrated solutions in a value network setting. However, Bertoni and Larsson's work only provides a limited list of individual challenges. So, it gives a narrow focus on VN-CKTC and a wider view on such challenges is still missing.

We also looked at knowledge transfer challenges on the broader research area of business networks where several studies have identified various types of challenges (e.g., (Duan, Nie, & Coakes, 2010; Haug, Stentoft Arlbjørn, Zachariassen, & Schlichter, 2013; Lin, Wu, & Yen, 2012; Pirkkalainen & Pawlowski, 2014; Yang & Maxwell, 2011; Zahedi et al., 2016)). However, the results of our review are quite mixed by the different efforts. In some studies, the focus is limited to examining a small and selected set of knowledge transfer challenges in a business network setting. For example, while Haug et al. (Haug et al., 2013) focus on information quality challenges and identified 12 challenges, Cumberland and Githens (2012) investigate challenges associated with tacit knowledge transfer and identified another five type of challenges. In some other studies, a more extensive lists of knowledge transfer challenges in a business network setting are identified (e.g., (Lin et al., 2012; Nidhra et al., 2013; Pirkkalainen & Pawlowski, 2014;

Zahedi et al., 2016). But a list proposed by one author differs from another. These differences indicate that there is an insufficient agreement between scholars about the underlying challenges. We come back to this comparison in Section 5. In addition, not all papers clearly explain a process of developing a classification framework (Kembro et al., 2017).

In summary, although these studies provide useful insights and relevant information, they depict a partial view on knowledge transfer challenges in network settings and their resulting challenges differ widely diverse. Therefore, none of the existing classification frameworks sufficiently covers the possible challenges.

## 3. Research methodology

The objective of this study is to design and validate a reference model of VN-CKTC, which by providing a systematic on the relevant challenges, aims to facilitate a shared understanding among actors of a value network about the challenges associated with customer knowledge transfer in a value network setting. To achieve this research objective, a two-phase research project following a design science approach was conducted. Design science research is an iterative approach for the design and evaluation of an artifact, where steps in the iteration take both relevance (i.e., the importance for the application field) and rigor (i.e., alignment with the academic state of the art) into account (Hevner et al., 2004; Peffers et al., 2007). According to design-and-evaluation cycle, in this study these steps were followed:

1) Problem identification and motivation (Section 1 and 2)
2) Design (Section 3.1)
   - A systematic literature review (SLR)
   - Structured classification
3) Evaluation (Section 3.2)
   - Validation of the designed artifact in a case situation
4) Suggestion for the redesign of the reference model if required (Section 4)

For the design phase, for the sake of readability, both approach and results are presented in Section 3.1. For the evaluation phase, only the approach is given in Section 3.2. The results of validation are provided separately in Section 4.

### 3.1. Design phase

This study aimed at developing a comprehensive and systematic overview of customer knowledge transfer challenges in a value network setting. To select the most appropriate research approach to identify these challenges, we consider two potential research approaches: a Grounded theory and a systematic literature review (SLR). A grounded theory research approach aims to explore challenges directly from empirical data. It is based on an iterative research process of adding new sample case which should be continued until data saturation is reached (Goulding, 2005). However, a value network is an emerging field. Thus finding enough proper cases, which have rich experience of long-term collaboration with customers, to support the comprehensive identification of the challenges and to reach a saturation point might be a time-consuming process. Also in an immature situation of a value network, it is likely that the results are based more on people's ideas than on their real experiences.

The second option is to identify the challenges from existing literature in business network settings by conducting a SLR. A value network is regarded as a specific type of business networks. Therefore, knowledge transfer challenges in a business network setting are also relevant to a value network setting. The investigation of knowledge transfer challenges in a business network setting has been the focus of a number of research studies. Thus literature provides a sufficient basis for identifying the challenges. Consequently, we selected the second option. The SLR is a systematic research approach enables a comprehensive search for identifying relevant challenges (Kitchenham & Charters, 2007; Tranfield et al., 2003), so it fits with our research objective.

Although by using the SLR approach the theoretical relevance of the challenges can be supported, their practical validation within a value network setting needs to be evaluated empirically. To confirm their practical relevance for a value network setting, we use a case study research approach (Section 3.2).

The design phase of this study consisted of two parts:

1 SLR
2 Structured classification

In part 1, for the identification of the customer knowledge transfer challenges in a business network, an SLR was conducted in the three-step process following the guidelines of (Kitchenham & Charters, 2007):

Step 1: Planning the review
Step 2: Conducting the review
Step 3: Drawing conclusions

In step 1, after identification of the need to conduct the SLR, a research question was formulated as "what are customer knowledge challenges in business network settings?" and a review protocol was developed. This protocol consists of a search space, a set of keywords, inclusion/exclusion criteria, and a data extraction approach. The search space of this study encompassed Emerald, Elsevier, Wiley, IEEE, and Springer databases, as they cover many publications in this field and are often used in such studies (Haug et al., 2013). To do the search in the selected databases, relevant keywords were listed and combined by Boolean operators (see Table 1).

Regarding the inclusion criteria, we selected articles focused on both knowledge transfer challenges and one kind of business networking, with the further provision that they must have been published in English language peer-reviewed publications. Articles were excluded if knowledge transfer challenges were only one among its topics, or if challenges were examined from a single firm perspective rather than from a network view.

For structuring the data extraction process, we designed a data extraction form. This included publication information, the title and the explanation of the challenges as described in the source.

In step 2, the search was done which led to identifying 6720 primary sources. After deleting duplicates, the titles and abstracts of the articles were reviewed based on inclusion and exclusion criteria. In the end, 52 articles were selected for full review and data extraction. The appendix enlists the papers included in this review. From these articles, a set of 268 knowledge transfer challenges were extracted.

In step 3, from the identified long list of challenges we observed that the results were mixed and that some challenges contained similar contents, originating from different studies. A structured approach towards ordering the results is required which leads to part 2.

In part 2 of the design phase, the extensive list of identified knowledge transfer challenges was classified in a structured way to

**Table 1**
Keywords used in the systematic review.

| | | | | | | |
|---|---|---|---|---|---|---|
| Explicit knowledge<br>*or*<br>Tacit knowledge<br>*or*<br>Information<br>*or*<br>knowledge | *And* | Transfer<br>*or*<br>Exchange<br>*or*<br>Sharing<br>*or*<br>Flow | *And* | Issue<br>*or*<br>Challenge<br>*or*<br>Barrier<br>*or*<br>Problem<br>*Or*<br>Obstacle | *And* | Value network<br>*or*<br>Collaborative network<br>*or*<br>Alliance<br>*or*<br>Supply chain<br>*or*<br>Inter-organization |

develop a framework. For this, a structured classification approach through Metaplan sessions was followed. The Metaplan is a card sorting technique based on group discussion. It facilitates a structured classification process. The group discussions aspect of this technique prevents individual bias in classification. (Habershon, 1993). To classify the challenges, three-step classification process were followed. In step one, the research group in two Metaplan sessions classify the original challenges into the categories (i.e., challenge types) by using data extraction forms from part 1. This was done by putting similar challenges together in such a way that reflected their similar underlying meaning. Step one resulted in grouping the initial 268 challenges into 49 challenge types. As an example these challenges: arduous relationship; power issues; status differences; lack of respect; difficult relationships; excessive size of business units; knowledge distance; age distance; and gender distance, which were identified from primary studies, were grouped into the challenge type *relationship*. In step two, the resulting challenge types were revisited in a second round in which some categories were merged and some categories were divided into more specific categories. Some categories renamed, and some remained unchanged. For instance, we noticed the inconsistency in naming a challenge type of *organizational challenges*. To be more specific, we renamed it as an *organizational governance*. This step resulted in a final set of 29 challenge types (Table 2). In step three, the 29 challenge types were integrated into core categories (i.e., challenge areas) at a higher abstraction level. This led to identifying six challenge areas which represented higher order concepts and captured the underlying commonalities among the 29 challenge types. The challenge areas were reviewed to better positioning of the challenge types into the challenge areas. Here, we noticed that the challenge type *difficulty to express tacit knowledge* was placed as the only challenge in a challenge area *generic challenges*. During this review, we found a better place for this challenge. As this challenge type could also be seen to belong to the *language/understanding* challenge area, we opted to merge the challenge area of *general distance* into this area. This classification process resulted in the proposed VN-CKTC reference model which encompass five challenge areas and 29 challenge types (Table 2). Full information of this process is presented in our previous work (Bagheri, Kusters, Trienekens, & Van Der Zandt, 2016).

### 3.2. Evaluation phase

In the evaluation phase, the proposed VN-CKTC reference model was validated in a value network setting. This means that, the practical relevance of each challenge types from this reference model (Table 2) in the real-life situation of value networks was evaluated. Besides that, to bring additional insights and further, the importance of the customer knowledge transfer challenge types in the real-life value networks were also identified and discussed.

In this phase, two research approaches of survey and case study can be considered as a candidate. The selected approach should comply with the following requirements:

(1) To investigate the contextual relevance of the customer knowledge transfer challenges, the research approach must adequately consider the context of value network and the experiences of actors. This requires in-depth discussions with actors to receive concrete examples in case that the challenges occur in real-life value networks.
(2) To investigate the importance of the customer knowledge transfer challenges, the approach must be capable of capturing the reason "why" the challenges are important.

Although through a survey a straightforward validation of the existing framework can be achieved, and information about relevant challenges can be achieved, a survey is not appropriate to give information about the specific context and experience of an actor. Through survey research it is hard to attain deep insights into how participants actually are facing the challenges (Easterbrook, Singer, Storey, & Damian, 2008). In addition, it would be unlikely to capture insights and reasons regarding "why" questions. However, a case study approach conforms well to these requirements. The contextual relevance of the VN-CKTC can be properly investigated by using a case study approach. A case study can provide a deep understanding of an investigated phenomenon in a real-life context (Yin, 2014). So, it is well-possible to capture the actual experience of actors of a value network through in-depth discussions with them. In addition, a case study allows researchers to answer "why" questions (Benbasat, Goldstein, & Mead, 1987; Yin, 2014). Consequently, it was decided to apply a case study approach for empirical validation of our VN-CKTC reference framework in the context of value network.

To deal with the generalizability of the results, as the main concern of the case study research approach, as suggested by several scholars the replication logic has been followed (Benbasat et al., 1987; Creswell, 2013; Yin, 2014). Accordingly, multiple case studies were conducted. The cross-case analysis and comparison of the results enable the achievement of more general and robust results (Yin, 2014).

#### 3.2.1. Case selection

In this study, a multiple case study was conducted. Since we aimed at addressing challenges in relation to customer knowledge transfer within a value network, the level of analysis was a network as a whole. Therefore, each case study entailed an entire network.

To select a relevant cases for this study, a purposive sampling strategy was applied (Coyne, 1997; Easterbrook et al., 2008). Accordingly, the case was selected by these criteria:

- To emphasize co-creation with customers; in the selected case the customers need to be the active players in an integrated solution provision process.
- In the selected cases, a concrete integrated solution has to be provided.
- In solution provision process, a collaboration of at least three actors is needed, as a triad is considered as the building block for value network studies (Ferreira, Cova, Spencer, & Proença, 2016).

Regarding the required number of case studies, Eisenhardt (1989); Cavaye (1996) suggest to study at least four, but not more than ten cases. This study is based on eight cases.

Then from each value network, one representative actor was selected to participate in this research. We expected that this is sufficient for the validation of the VN-CKTC reference model across eight value networks. We refer back to this choice in the discussion section. Participants were selected according to the following criteria:

- The participant works or has worked in the particular value network setting for at least two years. Given that value networks are a relatively new phenomenon increasing the number of years of experience would have made it very difficult to find enough participants for this study.
- The participant needs to have a background in knowledge management and has to be directly involved in knowledge transfer processes across the value network. It is assumed that only when a person is directly involved in knowledge transfer processes, he can have actual experiences with associated challenges.
- Organizational roles in relation to knowledge management and solution provision processes should be sufficiently knowledgeable for the purpose of this study. Accordingly, knowledge managers, customer managers, IT managers, and service delivery managers were considered in selecting the participants. Given that a customer-centric view is emphasized in value network studies, these roles give the opportunities to have more often contacts with customers during the provision of integrated solutions.

**Table 2**
the proposed VN-CKTC reference model (results of design phase).

| Challenge area | Challenge type | Primary studies | Challenge area | Challenge type | Primary studies |
|---|---|---|---|---|---|
| Network structure | Transactive memory | P1, P30, P40 | Organizational aspects | Organizational governance | P9, P11, P12, P22, P24, P33, P35, P37, P38, P44, P48 |
| | Relationship | P6, P7, P15, P23, P28, P36 | | Lack of top management commitment | P11, P22, P35, P39,P43 |
| | Complex network | PP16 | | Network level objective/benefit | P18, P19, P22, P38, P51 |
| | General distance | P13, P34, P37, P43 | | Authorization / data flow | P3, P12, P19, P26, P33, P38, P39, P42, P50 |
| | Cultural distance | P4, P6, P8, P13, P17, P24, P33, P34, P37, P43 | | Organization structural | P13, P16, P19, P24, P38, P51, P52 |
| | Lack of communication facilities | P24, P35, P37 | | Lack of incentive | P11, P24, P29, P37 |
| Social aspects | Knowledge source reliability | P29, P32 | | Performance measurement | P12, P18, P38 |
| | Fear of losing knowledge | P17, P19, P24, P29, P41, P46, P49 | | Insufficient resources | P11, P19, P24, P25, P26, P33, P35, P37, P38, P39, P45, P46 |
| | Lack of willingness | P4, P7, P13, P19, P21, P24, P29, P31, P33, P35, P36, P37, P38, P47, P50, P51, P52 | | Legal | P27, P37, P49, P51 |
| | Lack of trust | P13, P14, P16, P18, P20, P22, P31, P33, P35, P38, P46, P51, P52 | Technical aspects | Lack of user-friendly IS | P11, P41, P51 |
| Language/understanding | Insufficient mutual understanding | P9, P13, P21, P24, P29, P32, P36, P51 | | Failure to meet technological demand | P11, P12, P25, P26, P29, P35, P37, P38, P46 |
| | Contextualization | P1, P3, P5, P27, P37 | | Data quality | P12, P18, P26, P41, P51 |
| | Semantic | P1, P2, P5, P8, P17, P19, P21, P24, P32, P33, P37, P44 | | Data integration | P2, P12, P14, P18, P19, P24, P26, P35, P37, P38, P39, P45, P51 |
| | Difficulty in expressing tacit knowledge | P15, P33, P35 | | Data overload | P11, P19 |
| | | | | Data security | P10, P24, P26, P35, P37, P45, P46 |

P: primary studies which are listed in the Appendix.

**Table 3**
Summary of case description and participant information.

| Case | Solution offering | Participant information | | |
|---|---|---|---|---|
| | | Gender | Education level | Years of work experience |
| **Value network 1** | Customized object detection solution by use of image analysis technologies and advanced camera systems | Male | PhD | 20 |
| **Value network 2** | Customized communication management software solutions | Male | Master | 24 |
| **Value network 3** | Customized ICT solutions for education (e.g. timetable management system, student attendance registration, commitment monitoring and early warning solution | Male | Master | 36 |
| **Value network 4** | Customized ICT management solution to ensure a stable IT infrastructure (specialist in education domain) | Male | Master | 8 |
| **Value network 5** | Customized examination services (e.g. test development, test taking tools, sites, administration, certification) for industry | Male | Bachelor | 14 |
| **Value network 6** | Customized document management services for a bank | Male | Bachelor | 13 |
| **Value network 7** | Customized business intelligence consultancy services | Male | Master | 24 |
| **Value network 8** | Customized testing systems for industry | Female | Master | 14 |

- The participant is capable of giving answers at a high abstraction level and is willing to participate in this research.

Table 3 gives an overview of the studied cases and participants information. For reasons of confidentiality, the value networks are anonymized.

### 3.2.2. Data collection

To gather data from the real-life context of a value network, semi-structured interviews with the participants were conducted (Tong, Sainsbury, & Craig, 2007). To do this, a consistent and systematic process was followed by using an interview protocol. The interview protocol consists of three parts: general information, exploratory, and confirmatory. Regarding general information, at the beginning of each interview, participants were asked to draw a simple model of their network, consisting of actors and interrelations, to keep the focus of the conversation at the particular network level and to facilitate discussion during the interview. In the exploratory part of the interviews, an open question was asked to identify challenges regarding the customer-related knowledge transfer process within the value network, based on the participant experience. The open question was asked, without using challenges from the VN-CKTC reference framework, to prevent any inadvertent bias. This exploratory part of the interview allowed identifying any additional challenges that were not included in our reference framework. Then in the confirmatory part of the interviews, the practical relevance of each challenge types from the VN-CKTC reference model in a value network setting was asked. For this, a series of semi-structured open-end questions were defined in the interview protocol. Given that a semi-structured interview has a flexible structure, it allows the interviewer to change the order of questions and to clarify any ambiguous or complex question, and it also enables interviewees to answer in their own language (Qu & Dumay, 2011). The questions were organized based on the list of 29 challenges of the reference model. For each challenge type from Table 2 it was asked, whether you have an experience of that challenge in your network, and if so give an example. Here, again the emphasis was on the actual experience of the participants, i.e., they were asked to give factual evidences by giving real examples in their own contexts, rather than their perceptions and their ideas. If a challenge was recognized as a relevant challenge, it was then followed by asking about whether it is an important challenge and the "why" question. To prevent poorly formulated questions and to address eventual ambiguities, the protocol was evaluated by the research group and one pilot interview was carried out. Based on that, it was decided to use a definition of the challenge and to give an example about the type of challenge in the case of potential ambiguities. Also, examples in relation to the local context of each case study were used to reflect the local situation of each case. The resulting protocol was used in the data collection. All interviews were recorded and transcribed to facilitate the subsequent analysis and discussion.

In total eight in-depth interviews were conducted with one representative actor from each value network. The average duration of interview was a one and half hour.

### 3.2.3. Data analysis

Data analysis was done after all data was collected. Following the suggestions made by Yin (2014), data analysis was carried out in two separate phases. First, through a 'within case analysis' an in-depth understanding of the phenomenon was achieved. Second, through a 'cross-case analysis' the conclusion per challenge type were made. Each of these phases is explained in detail in the following.

*3.2.3.1. Within case analysis.* For each case study, interview data were analyzed. For this, the participants' answers during the in-depth interviews were analyzed. This was done systematically following the principles of deductive content analysis as suggested by Mayring (2014). The deductive content analysis is suitable for a situation

where the structure of analysis is operationalized on the basis of previous knowledge, and where the purpose of the study is theory testing (Elo & Kyngäs, 2008; Mayring, 2014). To better structuring the data analysis process and to provide consistency in the research team, a data extraction form was designed. It is based on our reference model with three columns: a 'relevance-example' column for quotes about examples of actual experience of a participant (to affirm the practical relevance of a challenge); the 'importance-why' column for the quotes to explain why a challenge is important; and the 'irrelevance' column to store quotes if a challenge is not relevant. Data analysis was started with transcribing the relevant parts of the taped interviews about each challenge. As interviews were guided by the interview protocol, in which the questions were organized in accordance with each VN-CKTC, the recognition of interview parts to particular challenges would be easy.

The positioning of the quotes in the relevant slots of the extraction form was done independently by two individual researchers. This was done to address the reliability of the content analysis process. There appeared to be a high consistency between the results of the two researchers. In the case of inconsistency there was a discussion to reach a joint agreement.

As an example, part of a completed form of case 7 is illustrated in Table 4.

*3.2.3.2. Cross-case analysis*. For each challenge type, the cross-case analysis was performed in several research team meetings whereby each challenge type was analyzed across all cases, and then a summary per challenge type was provided. To do this, three steps were followed.

First, per challenge type, the summary of evidence given by the eight participants regarding respectively relevance-example, importance-why, and irrelevance was integrated into a single table called 'cross-case data.' Second, the content of the evidence was an analysis based on the principles of deductive content analysis (Mayring, 2014). To structure the content analysis process, a cross-case analysis table was designed containing three columns, respectively: argumentation (including the example for relevance or irrelevance); reasons for "*why*" the challenge was important; the expected outcome of such a challenge; and the proposed solution. Since the outcome and solution were not in the original setting of this study, whenever possible they were included in the cross-case analysis table. Accordingly, the quotes were carefully read, case by case, to get an overview of all answers across cases. Then according to the defined structure of the content analysis, part of the texts, referring to relevance, irrelevance, and "why," were identified and highlighted (in light grey color)the research team and put in the argumentation slot of the cross-case analysis table. In addition, if it was possible, the expected outcome of a challenge, and the proposed solution were also identified and highlighted (in dark grey and black colors, and positioned into the dedicated slots in the cross-case analysis table. This table was completed for all of the 28 challenge types. Third, by using data from the cross-case analysis table, in several research group discussions, a summary for all challenge types was provided.

To give an example of how such a process was followed, the corresponding tables for the challenge type" lack trust" are provided in Tables 5–7.

Based on the results of the cross-case analysis, suggestions for a second version of the VN-CKTC reference model was provided (see Section 4).

### 3.3. Quality criteria assessment

The quality criteria of reliability and validity of the research will be addressed in this section. Both discussions on these criteria and several strategies to deal with them are provided as suggested by Merriam and Tisdell (2009); Creswell (2013); Yin (2014).

#### 3.3.1. Reliability

To ensure reliability of the research, the following strategies were applied:

- A well-structured data collection process as defined in the interview protocol was followed.
- Selection criteria for case and participant selections were defined and used.
- Clear case descriptions of all eight cases was provided.
- Data collection and data analysis processes were documented in a case database.
- Consistent data analysis for both within-case and cross-case analysis were applied.
- To avoid researcher bias and for cross-checking, within-case data analysis was performed independently by two researchers, and the results were compared. Consistency in the data analysis results of the two researchers reflects the reliability. In the case of disagreements, group meetings were organized to discuss the differences and to reach agreements.

#### 3.3.2. Construct validity

The strategies that were used to address construct validity are:

- To be sure that challenges being studied are covered completely, the interview protocol was designed on the basis of the reference model.
- A consistent understanding of the reference model by the researchers was provided. To this end, the researchers were involved in discussions on the VN-CKTC reference model. During these discussions, the definitions of challenge types and the extended descriptions of all challenge types, containing all underlying challenges, were used. Accordingly, misunderstandings or inconsistent interpretations were recognized, and the consensus was reached on the challenges.
- The interviewees need to have a consistent understanding of the challenge types and the context. For this, the definition of challenge types and the extended descriptions of challenge types, containing all underlying challenges, were used to clarify eventual ambiguous challenges. Regarding the context (i.e., the value network as a whole), to keep the focus of interview at a network level, a

**Table 4**
Example of data extraction form- case 7.

| | | | |
|---|---|---|---|
| **1. General information** | | | |
| Name of interviewee: | | Date of interview: | |
| Name of interviewer: | | Date of data extraction: | |
| **2. Detailed information** | | | |
| Challenge | Relevance-example | Importance-why | Irrelevance |
| Transactive memory challenges | | | *In our network, we know each other, we know each other's capabilities. So I don't see it as a challenge.* |
| Relationship challenges | *Some customers are larger than their partners and force them to adapt their systems to them. Partners can see us as suppliers at first and feel superior.* | *Once they see the value that we add, the feeling of superiority disappears* | |

**Table 5**
Example of cross-case data analysis for the Challenge "lack of trust".

| Lack of trust | case 1 | case 2 | case 3 | case 4 | case 5 | Case 6 | case 7 | case 8 |
|---|---|---|---|---|---|---|---|---|
| **Relevance-example** | Some partners want exclusive rights. They worry that the customer will go straight to us. | To prevent others from doing things with our knowledge that are not in our interest, we use | Not being able to speak freely, the risk of opportunistic behavior | | When a partner says he'll introduce me somewhere, he could run off with my idea | | | There is a big partner that thinks that they cannot trust the smaller partners. They think smaller ones only |
| | | non-disclosure agreements (NDAs) | | | | | | have commercial interests and don't focus enough on quality. |
| **Importance-why** | Slows down progress | Working on trust is preferred | It is an important issue as it makes free collaboration difficult, and make it discussable | | Not an important issue | | | I don't think it influences the quality of work. |
| **Irrelevance** | | | | No trust no partnership | | We don't have that with our partners. | It doesn't bother our network. Because who does well receives well. There is also transparency in our network. | |

**Table 6**
Example of cross-case analysis for the challenge "lack of trust".

| Challenge type | Argumentation | Expected outcomes | Proposed solution |
|---|---|---|---|
| Lack of trust | Some actors worry that the customer will go straight to us (case1), not speak freely, have opportunistic behaviour (case 3); no trust no partnership (case 4), is irrelevant when there is transparency (case 7). One big partner could not trust well the smaller ones (case 8) | Some partners want exclusive rights, slow down progress (case 1); make free collaboration difficult and discussable (case 3); some run off with other's ideas(case 5) | NDA(case 2) |

relationship diagram was drawn by each interviewee and was used during an interview.
- Both within-case and cross-case data analysis were performed systematically on the basis of a deductive content analysis approach, with detailed descriptions of how data was analyzed. Therefore, the link between results and raw data is traceable.
- The chain of evidence from the initial research question to the conclusion was available by explicitly describing the research methodology and the research process.

### 3.3.3. Internal validity

This has been achieved in the following way.

- To ensure that the participants' perspectives and meanings were correctly interpreted, the interview reports were sent, and the interviewees were asked to review them and to appraise the reports. In cases of inconsistencies, the interviewees were contacted to clarify them. Agreements were given by interviewees by emails.
- In data analysis only concrete examples based on real experiences of informants were included as being relevant and clear and structured answers to *why* questions were included as being important. Using this approach ensured that the results were based on people's real experience, instead of 'just' ideas. Consequently, the perceptions of the participants on relevance and importance of the challenges, in the context of value network, are based on concrete examples and good argumentations.

### 3.3.4. External validity

The external validity was achieved by using replication logic (Yin, 2014). In addition, a purposive sampling strategy with a set of criteria was applied to select the cases. Consequently, the findings of this study are relevant for value network environments and the generalization holds in other cases of similar type.

The research team recognized a threat of research validity (i.e., researcher bias) and attempted to deal with it as follows. Since the same researchers were involved in both data collection and analysis, they may suffer from prejudice regarding the interpretation of data. To overcome this challenge, To overcome this issue, a peer debriefing strategy as recommended by (Creswell, 2013; Easterbrook et al., 2008) was used, in which a research assistant collaborated in the research processes. Also, several research group discussions were held during data analysis, and structured data collection and analysis processes were followed.

## 4. Results

The results of design phase, for the sake of readability, are presented in Section 3.1 (see Table 2). In this section, the results of evaluation phase is presented. In general, these results show that the designed artifact is validated in the value network settings.

For each case analysis, data was analyzed according to the data analysis process described above. Following this process resulted in eight data extraction forms for the representative actor of the eight value networks (e.g., Table 4). These forms are stored in the research database and are available on request.

Then for each challenge types, a summary of results across eight value networks is provided in Table 8. To do this, the process as described in Section 3.2.3 was followed. This took place in a three-round

**Table 7**
Example of summary of results - challenge "lack of trust".

| Challenge type | Summary across eight cases |
|---|---|
| Lack of trust | This challenge has been recognized to a large extent across cases. The challenge is relevant when for example there is an opportunistic behavior of actors in the network. This might be the case for a larger actor which could not trust smaller ones. A lack of trust and a lack of partnership are considered as two related concepts. It is an important challenge since it slows down progress and makes free collaboration difficult. Also due to a lack of trust among actors, someone may request exclusive rights. When there is transparency among actors, the challenge becomes irrelevant. Using NDA is proposed as a solution to solve this challenge. |

research group discussion in which the real experiences and argumentations of the representative actors of the eight value networks were used to provide this summary.

Table 8 gives clarification of the evidence and arguments on relevance and degree of importance of the challenge types. Also some hints on the expected outcome of the VN-CKTC are given in Table 8 as well as some hints of solution types that might be used to deal with them. However, as mentioned in the methodology section, in this study, we did not specifically search for these, so these results are certainly preliminary.

## 5. Discussion

We organize the discussion section into five parts. In part 1, discussion on the results of the evaluation phase is given. The comparison of the VN-CKTC reference model with the existing frameworks is discussed in part 2. In part 3, the empirical findings of the expected outcomes and the solutions to overcome the challenges are discussed and compared with prior studies. The managerial and research implications are discussed in part 4. In the end, some discussion on the limitations of this study is given in part 5.

In part 1 of this discussion, we discuss six points about the results of the evaluation phase:

1) In the exploratory part of the interviews the participants were given the opportunity to identify the challenges they faced in customer knowledge transfer process within their network without showing them the VN-CKTC reference model. It was done to be able to identify additional challenges to complete the proposed reference model. Across eight case studies, this part resulted in a list of 21 challenges. Each of these could easily be placed into 13 challenge types of the VN-CKTC reference model. As a consequence, no additional challenges were added to the VN-CKTC reference model. These challenge types are: *complex network, general distance, fear of losing knowledge, lack of willingness, lack of trust, insufficient mutual understanding, semantic, organizational governance, network level objective/benefit, insufficient resources, authorization / data flow, legal,* and *data integration*. This finding provides further validation of the 12 challenges besides their validation in the second part of the interviews.
2) In the confirmatory part of the interviews, the VN-CKTC reference model was used explicitly. One noticeable result is that the 28 challenge types from this model were recognized in at least one and often in several cases as relevant challenges. These recognitions were based on good argumentation, and they were supported by concrete examples. This provides a validation for these challenges from the point of view of "it exists and can occur." This results shows the relevance in principle of these challenge for a value network setting.
3) The challenge *lack of communication facilities* was seen by all participants as an outdated challenge. Nowadays advanced information and communication technologies provide plenty of such facilities. Given this unanimity among participants we believed that further cases to acheive saturation were not required. Therefore, this challenge was not included in the VN-CKTC reference model. Consequently, this model encompasses five challenge areas and 28 challenge types (see left sides of Table 9).
4) We identified a set of ten challenge types that occur in more than half of the cases and are recognized by the participants as an important challenge. This set encompasses *complex network, data integration, lack of willingness, insufficient resources, semantic, organizational challenges, insufficient mutual understanding, authorization/ data flow, legal,* and *data quality*. All but one of these challenges (i.e., *data quality)* are also identified in the exploratory part of the interviews (see the first point of this discussion). These nine challenges gives us an indication of the most important and relevant VN-

**Table 8**
Summary of results across eight value networks per challenge type.

| Challenge type | Summary of results across cases | Number of validation across eight cases | |
|---|---|---|---|
| | | Exploratory part of the interviews | Confirmatory part of the interviews |
| Transactive memory | The challenge has been occurring for instance in an emerging value network when there is no collective memory yet. In some situations, the relationship with customers sounds to be troublesome. Customers, e.g. don't know who to ask certain questions. Although the challenge can have an impact on time, efficiency, missing service, and cost, it seems that it is not a severe problem for knowledge transfer within value network. Suggested solutions are close collaboration, frequent visiting, and open conversation among partners. | | 4 |
| Relationship | Almost all of the participants have recognized it as a relevant challenge. The challenge can occur when for instance there is a power distance, size differences, or some 'feeling of superiority.' The challenge is important due to its detrimental effect on the collaborative process, on knowledge sharing, and on efficiency. This challenge has been considered irrelevant when there is a peer to peer relationship. | | 7 |
| Complex network | This is a challenge when a large number of actors are involved in a large joint project. This is a serious challenge as it is difficult to manage it, and project goals may become fuzzy. Consequently, it limits the chance of success. The challenge is seen to be irrelevant for small joint projects. | 1 | 4 |
| General distance | Any form of separation can cause this challenge within the value network environment. The challenge is important as it makes cross-organizational communication hard and causes goal orientation problems. Suggested solutions are the use of digital aids or having at least one face to face meeting between the actors. | 1 | 5 |
| Cultural distance | The challenge is recognized when for example there is no reply to an offering. In some cultures, there is a tendency to keep things for themselves and to prefer to work with their existing friends. But the challenge is not seen as a big problem in knowledge transfer. | | 4 |
| Lack of communication facilities | The general response of all interviewers was that it is an outdated issue. Especially in these days Internet facilitates communication mechanisms. In contrast, *too many communication options* might be more of a challenge. | | All eight cases identified it as an outdated challenge |
| Knowledge source reliability | The challenge is relevant and important when there is a political game afoot among the value network actors, where one actor can deceive others. This challenge creates problems in collaboration and knowledge sharing. A suggested solution is having more contact or double-checking potential unreliable information. | | 3 |
| Fear of losing knowledge | The challenge occurs when for instance when an actor leaves the value network (e.g., being hired by a competitor). Knowledge leakage is dangerous and serious as it can enable one actor to take over the customer relationship and earn more with less risk. The challenge is less relevant when partners complement each other. The challenges can e.g. be controlled by a non-disclosure agreement (NDA). | 1 | 3 |
| Lack of willingness | The challenge is clearly a relevant challenge. When there is a doubt about the real partnership, fear of losing value, conflicting interests, and different preferences, partner are reluctant to share knowledge. Some actors don't find it necessary to share knowledge, they see it only as charity work. The challenge is important as it hinders progress. | 2 | 6 |
| Lack of Trust | The challenge is relevant when for example partners exhibit opportunistic behavior. Lack of trust and lack of partnership may be considered as two related concepts. It is an important challenge since it slows down progress and makes effective collaboration difficult. Also, due to a lack of trust among actors, someone may ask for exclusive rights. When there is sufficient transparency among actors, the challenge becomes less relevant. Using NDA and expressing concerns are proposed as solutions to deal with this challenge. | 1 | 5 |
| Insufficient mutual understanding | The challenge has been recognized widely in knowledge exchange both with the customer and with other partners. It can occur due to lack of know-how or unclear descriptions. Also, differences between disciplines and perception and views may play a role. It is an important challenge as it creates problems in communication and knowledge sharing. Accordingly, one can get ineffective support or make a decision which is not in line with the interest of other actors. Suggested solutions are promoting asking questions and holding discussions, or getting an advisor in with a similar background. | 2 | 6 |
| Contextualization | A number of concrete examples show this challenge is relevant for knowledge transfer within a value network setting. The challenge occurs when for instance there is a mistake leading to a wrong output (e.g., one actor needs C6 but gets C5). Context differences can raise the question of who pays for the mistake. It can also cause a misunderstanding. Solutions mentioned are in the area of increased communication and contact. | | 5 |

(*continued on next page*)

**Table 8** (*continued*)

| Challenge type | Summary of results across cases | Number of validation across eight cases | |
|---|---|---|---|
| | | Exploratory part of the interviews | Confirmatory part of the interviews |
| Semantic | Using abbreviations, jargon, and a wide range of definitions are examples that show actors have recognized this challenge. This challenge is important because it can lead to doing the wrong things. Additionally, due to the semantic challenges, actors don't necessarily share a common understanding. As a solution, it was suggested to have data definitions which confirmed by all actors. | 2 | 6 |
| Difficulty in expressing tacit knowledge | The challenge is recognized, but there is very limited concern about it. Almost all respondents consider this challenge either as a not important or as an irrelevant challenge. It can occur when for instance the customer can't explain his request well especially for more technical questions, so he gets a wrong answer. However, it is suggested can be easily handled by some more discussion with this costumer. | | 3 |
| Organizational governance | Although in theory, this challenge type covers a wide range of underlying problems, in practice the emphasis is mainly on lack of clear vision, guidelines, structure, and organization in knowledge sharing. The challenge is important as it raises the risk of losing valuable knowledge and it may cause inefficiency and dependency. Actors' commitment is suggested as a solution for this challenge. | 3 | 6 |
| Lack of top management commitment | The challenge has been mainly considered as an internal problem of a single actor rather than of the network as a whole. However, there is one good example that affirms this challenge can be relevant and important for knowledge transfer within the value network. When there is no top management commitment for networked collaboration, it hinders knowledge transfer and causes delays in offerings. | | 3 |
| Network level objective/benefit | This challenge has been recognized for instance when there is an unclear definition of the collaboration value, when some actors feel they get an unbalanced benefit, or when every actor focus on their gains (this might imply a distinction between an idealistic and a pragmatic view on value network). Therefore it hinders knowledge sharing. The challenge is a real problem as actors don't see the actual potential of collaboration. They might leave the value network, or the common network objectives might be lost. | 2 | 5 |
| Insufficient resources | The challenge has been widely recognized. Both lack of time and lack of knowledgeable workers in a value network are mentioned. This challenge is important. Because for example experts might be being hired by competitors, or customers might rely on people with the wrong knowledge. | 3 | 6 |
| Organization structural challenges | The challenge may occur when for example directives have to pass through different actors which then it causes mistakes. However, most of the participants do not see it as a real problem within their networks as their collaborations are fairly informal and less hierarchical. | | 2 |
| Lack of incentive | Only limited concern about this challenge has been found. One example is being rewarded more for direct sales than indirect sales through the value network. It was not widely recognized that lack of incentive is a challenge in knowledge sharing within the value network. Lack of intrinsic motivation and conflicting interest are mentioned as prerequisites for this challenge. | | 1 |
| Authorization/ data flow | This challenge has been recognized. An example is lack of access to classified data from or for customers. A lack of information flow may occur when there is insufficient updating, or late an actor is informed late by others (e.g., for cancellation). These challenges may cause missed opportunities and also a lack of awareness of what the other actors do. | 1 | 5 |
| Performance measurement | The challenge has been recognized. Due to emergent and small networked collaboration, there is as yet a lack of performance measurement. Consequently, when there is no monitoring and control, improvements may not be shared with other actors. Suggested approaches are procedures and guidelines for performance measurement regarding root cause analysis, assessing the level of engagements, knowledge management system evaluation, and monitoring. | | 2 |
| Legal | The challenge has been recognized. Examples are intellectual property (IP) rights, privacy laws, and legal challenges with digitalizing data. Due to this challenge, they are not allowed access to all data, and they have difficulty to exchange private or sensitive information. Consequently this challenge is important as it creates "waste". NDA has been mentioned as a type of solution. | 1 | 6 |
| Failure to meet technological demand | The challenge has been recognized to a limited extent. The given examples were very specific: lack of a database, no dedicated server, lack of a system for data storage. Most cases have seen this challenge from another perspective; challenges in using technology rather than a lack of functionalities of technology. | | 1 |
| Lack of user-friendly IS | The challenge has been found relevant with limited concern. An example given refers to a new system with too many options. This challenge results in a delay | | 1 |

(*continued on next page*)

**Table 8** (*continued*)

| Challenge type | Summary of results across cases | Number of validation across eight cases | |
|---|---|---|---|
| | | Exploratory part of the interviews | Confirmatory part of the interviews |
| | in adoption and acceptance of this technology because of a required learning curve. | | |
| Data quality | The challenge has been widely recognized. Incomplete data and poor quality data are mentioned. This challenge is important as actors are looking for something which is might longer exist. The challenge causes mistakes in reports, and it may lead to wrong decisions. | | 6 |
| Data overload | The challenge has been recognized by several participants as a relevant challenge. It may cause inefficiency or a lack of clarity in who pays for what. Suggested solutions are technological, such as computer grid. | | 2 |
| Data security | This challenge seems to be a sensitive and complex challenge. Some participant hesitated to talk about it. The challenge is relevant for instance when one actor by knowing a URL can log in from an unsecured environment, or when actor overreacts and seals everything so people could not access relevant data. The challenge is closely related to transparency. The challenge is important as one can abuse data and such data can be sensitive. To overcome the challenge encryption is mentioned as a solution type. | | 3 |
| Data integration | The challenge has been widely recognized. For instance, different systems using different identifiers for customers. Due to such a challenge there is a limited connection between systems or one system is not able to store data. The challenge is found to be an important challenge as it causes incorrect information and might impact the business outcome. | 1 | 5 |

Discussions on the results will be given in the following section.

CKTC within the specific context of a value network. These are the ones that value networks could start looking at. However, since the data that were used in the analysis were not based on a representative sampling of survey type research, the results are not statistically significant. This requires further investigation in future research through conducting large-scale survey.

5) The two challenges of *lack of incentive* and *failure to meet technological demand* were only recognized in a single case and they are considered by the participant as unimportant challenges. This suggests that these are ones that probably should be looked at last, if at all. This could be confirmed in future research.
6) Apart from the summary of challenge types (Table 8), a more general overview of the challenges can be obtained when we look at the level of the challenge area. From analysis of empirical data, we identified that the most of challenge types that identified by participants as relevant challenge fall under the areas of *language/understanding* and *network structure*. We also realized that most of challenge types identified by participants as an important, fall under the challenge area of the *social* aspect. This result is in line with research which emphasizes the importance of social and communicational challenges in value network studies (Matthyssens & Vandenbempt, 2008). This findings indicate that these challenge areas: *language/understanding*, *network structure*, and *social aspect* might be the more problematic areas in a value network setting. This needs further investigation in future research.

Regarding part 2 of this discussion, the importance and relevance of knowledge transfer challenges in a network setting are acknowledged in the literature. However, the comparison of the proposed VN-CKTC reference model, which is validated in practice, with the existing frameworks (Table 9) reveals that the previous studies are divergent in their approach and limited in the scope. Therefore, they provide insufficient coverage of the possible challenges. In contrast, our VN-CKTC reference model has a broader scope and embraces all challenges mentioned by other frameworks and several more. For instance, while the existing frameworks recurrently report the challenges such as *data integration, lack of willingness,* and *lack of trust*, none of them identify these four challenges: *complex network, knowledge source reliability, authorization/data flow,* and *data overload*. Hence, the VN-CKTC reference model, which relies on a well-structured methodology, proposes a wider view of the challenges.

Regarding part 3 of this section, the main empirical findings are better understanding and descriptions of the VN-CKTC based on the real experiences of the participants and also the identification of occurrence and importance of these challenges in a value network setting. Besides that, through further content analysis of the empirical data, we identified some indications on the expected outcomes of the VN-CKTC, and some indication of the solution types suggested overcoming them. In the following, the empirical findings of this study on the expected outcomes and the solutions to overcome the challenges are discussed and compared with prior studies.

Regarding the expected outcomes, as mentioned by the participants, the VN-CKTC have negative consequences. They negatively effect on the traditional variety of performance measures (e.g., efficiency, time, cost, joint- goal problems, dependency, delays, wrong joint decisions, additional works, who pays for the mistake, hinder/slow down/stop collaboration) as well as on the customer experience (e.g., service missing, get wrong answer/support, not understanding/ misunderstanding the customer problem, one actor may take over the customer relation). However, the findings did not reveal measures that analyze customer experiences in detail. This limitation is in line with a general concern among scholars that metrics used to measure co-creation value and the (quality of the) customer experience have not yet been well developed (Lemke, Clark, & Wilson, 2011; Payne et al., 2008). Since the customer experience is personal, to be able to measure such outcomes, it is required to define desired outcomes (Zomerdijk & Voss, 2010) and to develop metrics on customer experience quality (Andreassen et al., 2016; Lemke et al., 2011).

Regarding the proposed solutions to overcome the VN-CKTC, the participants mentioned solutions in the communication area (such as having at least one meeting, joint kick-off meeting, conversation, communication, contact, asking and double checking). Commitment to

**Table 9**
Comparison of VN-CKTC reference model with other frameworks.

| The VN-CKTC reference model | | Existing frameworks | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Challenge area | Challenge type | Duan et al. (2010) | Lin et al. (2012) | Pirkkalainen and Pawlowski (2014) | Hong et al. (2011) | Paulin and Winroth (2013) | Haug et al. (2013) | Yang and Maxwell (2011) | Patil and Kant (2014) | Kembro et al. (2017) | Zahedi et al. (2016) |
| *Network structure* | Transactive memory | | √ | | | | | | | | √ |
| | Relationship | √ | | | | √ | | | | √ | √ |
| | Complex network | | | | | | | | | | |
| | General distance | | | | √ | | | | | | √ |
| | Cultural distance | √ | √ | √ | √ | | | | | √ | √ |
| *Social aspect* | Knowledge source reliability | | | | | | | | | | |
| | Fear of losing knowledge | | √ | | | | | | | | √ |
| | Lack of willingness | | √ | √ | √ | √ | | √ | √ | | √ |
| | Lack of trust | | | √ | √ | | | √ | √ | √ | √ |
| *language / understanding* | Insufficient mutual understanding | | √ | | √ | √ | | √ | | | |
| | Contextualization | | | √ | | | | | | | √ |
| | Semantic | | √ | √ | | | | | | √ | √ |
| | Difficulty in expressing tacit knowledge | | | | | | | | √ | | √ |
| *Organizational aspect* | Organizational governance | | √ | √ | | | √ | | √ | √ | √ |
| | Lack of top management commitment | | | | | | √ | | √ | | |
| | Network level objective/ benefit | | | | | | | √ | | √ | √ |
| | Insufficient resources | | √ | √ | √ | | √ | | √ | √ | √ |
| | Organization structural challenges | √ | √ | | | | | √ | | | √ |
| | Lack of incentive | | | √ | | | √ | | | | |
| | Authorization / data flow | | | | | | | | | | |
| | Performance measurement | | | | | | | | | √ | |
| | Legal | | | √ | | | | √ | | √ | |
| *Technical aspect* | Failure to meet technological demand | | | √ | | | √ | | √ | | √ |
| | Lack of user-friendly IS | | | | | | √ | √ | | | √ |
| | Data quality | | | | | | | √ | | √ | |
| | Data overload | | | | | | | | | | |
| | Data security | | √ | √ | | | | | √ | | |
| | Data integration | | √ | √ | | | | √ | √ | √ | √ |

(√: knowledge transfer challenge is identified).

the partnership and a predilection for partners with a similar size and background were also mentioned. More technical solutions were also stated by the participants, such as data definitions confirmed by all actors, non-disclosure agreements, and computer grid. To address knowledge transfer challenges, in literature, a number of solution types such as managerial, communicational, technological, architectural, and governance solutions are suggested. For instance, Alavi and Tiwana (2002) propose different knowledge management approaches (e.g., searchable repositories and notification profiles) to deal with the transactive memory challenge and failure in sharing contextual knowledge. Collins and Hitt (2006) propose learning by doing, frequent communication, and on-site meeting as solutions to overcome challenges of sharing tacit knowledge between collaborating partners. Riege (2007) suggests a list of managerial actions to prevail over knowledge transfer challenges. Regarding technological solutions, three examples are given. Hong, Suh, and Koo, (2011) propose the use of conversational knowledge sharing based on a community of practice and Web 2.0 to resolve knowledge transfer challenges. Ng, Scharf, Pogrebna, and Maull, (2015) offer informational asymmetries, and complexity challenges of knowledge transfer can be solved by using Internet of Things. Butler, Feller, Pope, Emerson, and Murphy, (2008) propose a technical architecture to support knowledge sharing. Besides these suggested solutions which are more focused on specific challenges, in some other studies, a broader range of solutions for different knowledge transfer challenges are identified (Nidhra et al., 2013; Zahedi et al., 2016).

In part 4 of this section, research and managerial implications are discussed. Regarding research implications, the identified challenges, which are validated by the empirical evidences, demonstrate customer knowledge transfer in a value network setting is a problematic area and the VN-CKTC reference model provides overviews on what types of challenges might be encountered in a value network setting. More specifically, a set of nine challenges: *complex network, data integration, lack of willingness, insufficient resources, semantic, organizational challenges, insufficient mutual understanding, authorization/ data flow,* and *data quality* were identified in more than half of the cases and are recognized by the participants as an important challenge. These challenges were also identified in the exploratory part of the interviews. This set gives an indication of the most important and relevant VN-CKTC within the specific context of a value network. This requires further investigation in future research.

In addition, the proposed VN-CKTC reference model has four additional challenges (i.e., *complex network, knowledge source reliability, authorization/data flow,* and *data overload*) which are not covered by the existing frameworks (Table 9). We suggest that more attention should be paid to investigating these additional challenges in future research.

Regarding managerial implications, customer knowledge transfer among actors of the VNs is required to facilitate and to improve the co-created customer solution experience. To achieve effective knowledge transfer across a value network, this VN-CKTC reference model provides a well-structured insight for decision makers in a value network to analyse their situation. They can assess their network against the list of 28 challenge types to identify existing or potential challenges. Then based on the results of such an analysis, a prioritized list of the most critical challenges which frequently occur in their value network can be developed. Accordingly, managerial effort, resource allocation, and different types of solutions may be directed to deal with the identified challenges. For instance, such a prioritized list of VN-CKTC can provide a well-defined basis to guide a user requirements elicitation process aimed at developing relevant IT-based systems supports (Bagheri, Kusters, & Trienekens, 2017).

In the last part of this section, limitations of this study are discussed. Firstly, in contrast with the outdated challenge *lack of communication facilities*, it was suggested in case 7 that the opposite might be true. As the participant from case 7 stated, "*the sending side wants to communicate this but what channel do we use? So that is a consideration. That you don't know anymore what is the best channel? At the receiving side: does he keep track of all those media?*" Hence, *too many communication options* might be more of a challenge for customer knowledge transfer across the value network. However, as this challenge was not asked/validated by the other participants, we could not add it to the VN-CKTC reference model. The relevance of this suggested challenge to be included in the VN-CKTC reference model should be investigated in future studies.

Secondly, it should be noticed that the identified knowledge transfer challenges from literature are by no means exhaustive as the keywords used in this systematic review may have biased the coverage of literature. Doing so is beyond the scope of this paper. To counter this bias, in the exploratory part of the interviews, open questions were asked enabling identification of additional challenges that were not included in the proposed VN-CKTC reference framework. Given that the results of this exploratory part overlapped fully with already identified challenges we can be with some confidence state that at least the most relevant challenges have been identified.

Thirdly, we evaluate the validity of the VN-CKTC reference model. Other evaluation criteria of a reference model (e.g., usability and understandability) as suggested by Matook and Indulska (2009) should be investigated in future research, although the reactions of the participants suggest acceptance for these challenges.

Fourthly, our empirical findings confirm that the knowledge transfer challenges which are relevant to a business network setting are also relevant to a value network setting. However, we could not find any additional challenge which is specifically relevant for a value network. This means that while our VN-CKTC reference model suggests we cover a most relevant challenges, we cannot claim this list of challenges is complete. This limitation calls for further studies to identify the context-dependent VN-CKTC in a value network setting.

Fifthly, we examined the relevance of the VN-CKTC based on the argumentation of a single actor per value network. For the purpose of the evaluation phase of this study (i.e., validation of the VN-CKTC reference model) this is sufficient. However, in future study with the aim of further understanding of how to deal with such challenges, convergent actions of different actors of the same value network is required. Development of joint actions of different actors, with different perceptions on relevance and importance of the challenges, to mitigate challenges should be investigated in future research.

## 6. Conclusions and future work

This paper, based on a design science research approach, describes the research process of the design and validation of the VN-CKTC reference model. In the design phase, by conducting SLR followed by structured classification, the first version of a VN-CKTC reference model has been designed. In the evaluation phase, this designed artifact was validated across eight value networks. Based on a well-structured data collection and analysis process, 28 challenge types- listed in the VN-CKTC reference model - have been validated and further elaborated on the basis of actual examples and good arguments of the participants. Hence it is reasonable to conclude that these challenges are relevant for customer knowledge transfer within the context of a value network. This phase resulted in a second version of the reference model which encompasses 28 challenge types aggregated in five challenge areas of *network structure, social aspect, language/understanding, organizational aspect,* and *technical aspect challenges*. Our VN-CKTC reference model provides a systematic and wider view of the challenges in relation to customer knowledge transfer in a value network setting. This reference model can provide a common language that value network actors can use to describe VN-CKTC and thus it can support achieving a shared understanding among actors of a value network about these challenges.

We make the following two contributions to the customer knowledge transfer challenges literature. Firstly, following a well-structured methodology, the resulting VN-CKTC reference model provides a systematic and wider view of the various kinds of customer knowledge transfer challenges within a network setting. Secondly, based on actual

experiences of representative actors of eight value networks, the arguments about relevance and importance of VN-CKTC in real-life value network settings are provided which brings additional insights on these challenges in the complex situation of value networks.

Besides the limitations of this study (see Section 5) which give opportunities for further research, here some additional suggestions for future studies are given. Firstly, the resulting validated VN-CKTC reference model can provide a well-established basis for communication and shared understanding about analysis and design of IT-based systems to address knowledge transfer challenges in a value network setting. The usefulness and applicability of this approach should be investigated in future research. Secondly, in this research we conducted eight case studies to validate the relevance of a set of customer knowledge transfer challenges, based on factual evidence and argumentation of participants, in a value network setting. Therefore, the findings of this study are relevant for value network environments. To transfer findings into other type of networks and to enhance the generalization, we suggest to identify similarities and differences for various type of networks in future research. Similarly, the comparison between knowledge transfer challenges within single firms and networks would be a relevant topic for a future studies. Thirdly, future research can also study the effect of contextualization on the perceived challenges by investigating how the distinctive characteristics of each type of network may affect the knowledge transfer process and its related challenges.

## Appendix A

A list of primary studies:

[P1]M. Alavi and A. Tiwana, "Knowledge integration in virtual teams: The potential role of KMS," Journal of the American Society for Information Science and Technology, vol. 53, pp. 1029–1037, 2002.

[P2]P. Bjørn and O. Ngwenyama, "Virtual team collaboration: building shared meaning, resolving breakdowns and creating translucence," Information Systems Journal, vol. 19, pp. 227–253, 2009.

[P3]C. D. Cramton, "The mutual knowledge problem and its consequences for dispersed collaboration," Organization science, vol. 12, pp. 346–371, 2001.

[P4]D. Cumberland and R. Githens, "Tacit knowledge barriers in franchising: practical solutions," Journal of Workplace Learning, vol. 24, pp. 48–58, 2012.

[P5]J. L. Cummings and B.-S. Teng, "Transferring R&D knowledge: the key factors affecting knowledge transfer success," Journal of Engineering and technology management, vol. 20, pp. 39–68, 2003.

[P6]Y. Duan, W. Nie, and E. Coakes, "Identifying key factors affecting transnational knowledge transfer," Information & management, vol. 47, pp. 356–363, 2010.

[P7]M. Easterby-Smith, M. A. Lyles, and E. W. Tsang, "Inter-organizational knowledge transfer: Current themes and future prospects," Journal of management studies, vol. 45, pp. 677–690, 2008.

[P8]M. Eppler, "Knowledge communication problems between experts and decision makers: an overview and classification," The Electronic Journal of Knowledge Management, vol. 5, pp. 291–300, 2007.

[P9]T. Haldin-Herrgard, "Difficulties in diffusion of tacit knowledge in organizations," Journal of Intellectual capital, vol. 1, pp. 357–365, 2000.

[P10]A. Haug and J. Stentoft Arlbjørn, "Barriers to master data quality," Journal of Enterprise Information Management, vol. 24, pp. 288–303, 2011.

[P11]A. Haug, J. Stentoft Arlbjørn, F. Zachariassen, and J. Schlichter, "Master data quality barriers: an empirical investigation," Industrial Management & Data Systems, vol. 113, pp. 234–249, 2013.

[P12]B. Hicks, S. Culley, and C. McMahon, "A study of issues relating to information management across engineering SMEs," International Journal of Information Management, vol. 26, pp. 267–289, 2006.

[P13]D. Hong, E. Suh, and C. Koo, "Developing strategies for overcoming barriers to knowledge sharing based on conversational knowledge management: A case study of a financial company," Expert systems with Applications, vol. 38, pp. 14417–14427, 2011.

[P14]M. Howard, R. Vidgen, and P. Powell, "Automotive e-hubs: exploring motivations and barriers to collaboration and interaction," The Journal of Strategic Information Systems, vol. 15, pp. 51–75, 2006.

[P15]M. Huysman and V. Wulf, "IT to support knowledge sharing in communities, towards a social capital analysis," Journal of information technology, vol. 21, pp. 40–51, 2006.

[P16]C. J. Ivory, N. Alderman, A. T. Thwaites, I. P. McLoughlin, and R. Vaughan, "Working around the Barriers to Creating and Sharing Knowledge in Capital Goods Projects: the Client's Perspective*," British Journal of Management, vol. 18, pp. 224–240, 2007.

[P17]S. L. Jarvenpaa and A. Majchrzak, "Knowledge collaboration among professionals protecting national security: Role of transactive memories in ego-centered knowledge networks," Organization Science, vol. 19, pp. 260–276, 2008.

[P18]J. H. Kembro, K. Selviaridis, and B. Wagner, "Exploring information sharing in the extended supply chain: an interdependence perspective," Supply Chain Management: An International Journal, vol. 20, 2015.

[P19]M. Khurana, P. Mishra, and A. Singh, "Barriers to information sharing in supply chain of manufacturing industries," International Journal of Manufacturing Systems, vol. 1, pp. 9–29, 2011.

[P20]J. Kotlarsky and I. Oshri, "Social ties, knowledge sharing and successful collaboration in globally distributed system development projects," European Journal of Information Systems, vol. 14, pp. 37–48, 2005.

[P21]J. Kotlarsky, B. van den Hooff, and L. Houtman, "Are we on the same page? Knowledge boundaries and transactive memory system development in cross-functional teams," Communication research, vol. 42, pp. 319–344, 2015.

[P22]S. Li and B. Lin, "Accessing information sharing and information quality in supply chain management," Decision support systems, vol. 42, pp. 1641–1656, 2006.

[P23]C. Lin, B. Tan, and S. Chang, "An exploratory model of knowledge flow barriers within healthcare" Information & Management, vol. 45, pp. 331–339, 2008.

[P24]C. Lin, J.-C. Wu, and D. C. Yen, "Exploring barriers to knowledge flow at different knowledge management maturity stages," Information & Management, vol. 49, pp. 10–23, 2012.

[P25]Z. Lotfi, M. Mukhtar, S. Sahran, and A. T. Zadeh, "Information sharing in supply Chain management," Procedia Technology, vol. 11, pp. 298–304, 2013.

[P26]N. Madenas, A. Tiwari, C. Turner, S. Peachey, and H.-J. Steenhuis, "An analysis of supply chain issues relating to information flow during the automotive product development," Journal of Manufacturing Technology Management, vol. 26, 2015.

[P27]A. Majchrzak, A. Malhotra, and R. John, "Perceived individual collaboration know-how development through information technology–enabled contextualization: Evidence from distributed teams," Information systems research, vol. 16, pp. 9–27, 2005.

[P28]A. Malhotra and A. Majchrzak, "Enabling knowledge creation in far-flung teams: best practices for IT support and knowledge sharing," Journal of Knowledge Management, vol. 8, pp. 75–88, 2004.

[P29]S. McLaughlin, R. A. Paton, and D. K. Macbeth, "Barrier impact on organizational learning within complex organizations," Journal of knowledge management, vol. 12, pp. 107–123, 2008.

[P30]H. Melkas and V. Harmaakorpi, "Data, information and knowledge in regional innovation networks: Quality considerations and brokerage functions," European Journal of Innovation Management, vol. 11, pp. 103–124, 2008.

[P31]D. Nevo, I. Benbasat, and Y. Wand, "Understanding technology support for organizational transactive memory: Requirements,

application, and customization," Journal of Management Information Systems, vol. 28, pp. 69–98, 2012.

[P32]D. Nevo and Y. Wand, "Organizational memory information systems: a transactive memory approach," Decision support systems, vol. 39, pp. 549–562, 2005.

[P33]S. Nidhra, M. Yanamadala, W. Afzal, and R. Torkar, "Knowledge transfer challenges and mitigation strategies in global software development—A systematic literature review and industrial validation," International journal of information management, vol. 33, pp. 333–355, 2013.

[P34]J. Noll, S. Beecham, and I. Richardson, "Global software development and collaboration: barriers and solutions," ACM Inroads, vol. 1, pp. 66–78, 2010.

[P35]S. K. Patil and R. Kant, "A fuzzy AHP-TOPSIS framework for ranking the solutions of Knowledge Management adoption in Supply Chain to overcome its barriers," Expert Systems with Applications, vol. 41, pp. 679–693, 2014.

[P36]D. Paulin and M. Winroth, "Facilitators, Inhibitors, and Obstacles–A Refined Categorization Regarding Barriers for Knowledge Transfer, Sharing, and Flow," in Proceedings of the 10th International Conference on Intellectual Capital, knowledge Management and Organisational Learning: ICICKM 2013, 2013, p. 320.

[P37]H. Pirkkalainen and J. M. Pawlowski, "Global social knowledge management–understanding barriers for global workers utilizing social software," Computers in Human Behavior, vol. 30, pp. 637–647, 2014.

[P38]D. Praditya and M. Janssen, "Benefits and Challenges in Information Sharing Between the Public and Private Sectors," in Proceedings of the 15th European Conference on eGovernment 2015: ECEG 2015, 2015, p. 246.

[P39]A. A. Pujara, R. Kant, and M. Singh, "Information sharing in supply chain: Modeling the barriers," in Industrial Engineering and Engineering Management (IEEM), 2011 IEEE International Conference on, 2011, pp. 918–922.

[P40]L. Rao and K.-M. Osei-Bryson, "Towards defining dimensions of knowledge systems quality," Expert Systems with Applications, vol. 33, pp. 368–378, 2007.

[P41]T. C. Redman, "The impact of poor data quality on the typical enterprise," Communications of the ACM, vol. 41, pp. 79–82, 1998.

[P42]E. Revilla, J. Sarkis, and J. Acosta, "Towards a knowledge management and learning taxonomy for research joint ventures," Technovation, vol. 25, pp. 1307–1316, 2005.

[P43]B. Rosen, S. Furst, and R. Blackburn, "Overcoming barriers to knowledge sharing in virtual teams," Organizational Dynamics, vol. 36, pp. 259–273, 2007.

[P44]S. Ryan and R. V. O'Connor, "Acquiring and sharing tacit knowledge in software development teams: An empirical study," Information and Software Technology, vol. 55, pp. 1614–1624, 2013.

[P45]D. S. Sayogo and J. R. Gil-Garcia, "Understanding the determinants of success in inter-organizational information sharing initiatives: results from a national survey," in Proceedings of the 15th Annual International Conference on Digital Government Research, 2014, pp. 100–109.

[P46]D. S. Sayogo, J. Zhang, L. Luna-Reyes, H. Jarman, G. Tayi, D. L. Andersen, et al., "Challenges and requirements for developing data architecture supporting integration of sustainable supply chains," Information Technology and Management, vol. 16, pp. 5–18, 2015.

[P47]M. L. Sheng, S.-Y. Chang, T. Teo, and Y.-F. Lin, "Knowledge barriers, knowledge transfer, and innovation competitive advantage in healthcare settings," Management Decision, vol. 51, pp. 461–478, 2013.

[P48]W. A. Sun, S. Mollaoglu, V. Miller, and B. Manata, "Communication Behaviors to Implement Innovations: How Do AEC Teams Communicate in IPD Projects?," Project Management Journal, vol. 46, pp. 84–96, 2015.

[P49]T. van den Broek and A. F. van Veenstra, "Modes of Governance in Inter-Organizational Data Collaborations," 2015.

[P50]S.-U. Yang, M. Kang, and H. Cha, "A Study on Dialogic Communication, Trust, and Distrust: Testing a Scale for Measuring Organization–Public Dialogic Communication (OPDC)," Journal of Public Relations Research, vol. 27, pp. 175–192, 2015.

[P51]T.-M. Yang and T. A. Maxwell, "Information-sharing in public organizations: A literature review of interpersonal, intra-organizational and inter-organizational success factors," Government Information Quarterly, vol. 28, pp. 164–175, 2011.

[P52]P. Yih-Tong Sun and J. L. Scott, "An investigation of barriers to knowledge transfer," Journal of knowledge management, vol. 9, pp. 75–90, 2005

## References

Ahlemann, F. (2009). Towards a conceptual reference model for project management information systems. *International Journal of Project Management, 27*, 19–30.

Alavi, M., & Tiwana, A. (2002). Knowledge integration in virtual teams: The potential role of KMS. *Journal of the American Society for Information Science and Technology, 53*, 1029–1037.

Andreassen, T. W., Kristensson, P., Lervik-Olsen, L., Parasuraman, A., McColl-Kennedy, J. R., Edvardsson, B., et al. (2016). Linking service design to value creation and service research. *Journal of Service Management, 27*, 21–29.

Bagheri, S., Kusters, R., & Trienekens, J. (2015). The customer knowledge management lifecycle in PSS value networks: Towards process characterization. *Academic Conferences and Publishing International Limited Reading*, 66–77.

Bagheri, S., Kusters, R. J., & Trienekens, J. J. (2017). Eliciting end users requirements of a supportive system for tacit knowledge management processes in value networks: a Delphi study. *2017 International Conference on Engineering, Technology and Innovation (ICE/ITMC)*, 1317–1326.

Bagheri, S., Kusters, R. J., Trienekens, J. J., & Van Der Zandt, H. V. (2016). Classification framework of knowledge transfer issues across value networks. *Procedia CIRP, 47*, 382–387.

Ballantyne, D., & Varey, R. J. (2006). Creating value-in-use through marketing interaction: The exchange logic of relating, communicating and knowing. *Marketing Theory, 6*, 335–348.

Benbasat, I., Goldstein, D. K., & Mead, M. (1987). The case research strategy in studies of information systems. *MIS Quarterly*, 369–386.

Bertoni, M., & Larsson, A. (2010). Coping with the knowledge sharing barriers in product service systems design. *International Symposium on Tools and Methods of Competitive Engineering: 12/04/2010-16/04/2010*, 903–915.

Butler, T., Feller, J., Pope, A., Emerson, B., & Murphy, C. (2008). Designing a core IT artefact for Knowledge Management Systems using participatory action research in a government and a non-government organisation. *The Journal of Strategic Information Systems, 17*, 249–267.

Camarinha-Matos, L. M. (2014). *Collaborative networks: A mechanism for enterprise agility and resilience. Enterprise interoperability VI.* Springer.

Cavaye, A. L. (1996). Case study research: A multi-faceted research approach for IS. *Information Systems Journal, 6*, 227–242.

Chuang, S.-H., & Lin, H.-N. (2015). Co-creating e-service innovations: Theory, practice, and impact on firm performance. *International Journal of Information Management, 35*, 277–291.

Collins, J. D., & Hitt, M. A. (2006). Leveraging tacit knowledge in alliances: The importance of using relational capabilities to build and leverage relational capital. *Journal of Engineering and Technology Management, 23*, 147–167.

Coyne, I. T. (1997). Sampling in qualitative research. Purposeful and theoretical sampling; merging or clear boundaries? *Journal of Advanced Nursing, 26*, 623–630.

Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches.* Sage publications.

Cumberland, D., & Githens, R. (2012). Tacit knowledge barriers in franchising: Practical solutions. *The Journal of Workplace Learning, 24*, 48–58.

Duan, Y., Nie, W., & Coakes, E. (2010). Identifying key factors affecting transnational knowledge transfer. *Information & Management, 47*, 356–363.

Easterbrook, S., Singer, J., Storey, M.-A., & Damian, D. (2008). *Selecting empirical methods for software engineering research. Guide to advanced empirical software engineering.* Springer.

Eisenhardt, K. M. (1989). Building theories from case study research. *The Academy of Management Review, 14*, 532–550.

Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing, 62*, 107–115.

Ferreira, F. N. H., Cova, B., Spencer, R., & Proença, J. F. (2016). A dynamics-based approach to solutions typology: A case from the aerospace industry. *Industrial Marketing Management, 58*, 114–122.

Frank, U. (2007). *Evaluation of reference models. Reference modeling for business systems analysis.* 118–140.

Frow, P., Mccoll-Kennedy, J. R., Hilton, T., Davidson, A., Payne, A., & Brozovic, D. (2014). Value propositions: A service ecosystems perspective. *Marketing Theory, 14*, 327–351.

Ghobadi, S., & Mathiassen, L. (2016). Perceived barriers to effective knowledge sharing in agile software teams. *Information Systems Journal, 26*, 95–125.

Goulding, C. (2005). Grounded theory, ethnography and phenomenology: A comparative analysis of three qualitative strategies for marketing research. *European Journal of*

*Marketing, 39*, 294–308.
Grefen, P., Rinderle-Ma, S., Dustdar, S., Fdhila, W., Mendling, J., & Schulte, S. (2018). Charting process-based collaboration support in agile business networks: Aligning the need for a dynamic internet of processes from industry and research perspectives. *IEEE Internet Computing, 22*, 48–57.
Grönroos, C. (2004). The relationship marketing process: Communication, interaction, dialogue, value. *Journal of Business and Industrial Marketing, 19*, 99–113.
Habershon, N. (1993). Metaplan (R): Achieving two-way communications. *Journal of European Industrial Training, 17*.
Hakanen, T. (2014). Co-creating integrated solutions within business networks: The KAM team as knowledge integrator. *Industrial Marketing Management, 43*, 1195–1203.
Hakanen, T., & Jaakkola, E. (2012). Co-creating customer-focused solutions within business networks: A service perspective. *Journal of Service Management, 23*, 593–611.
Haug, A., Stentoft Arlbjørn, J., Zachariassen, F., & Schlichter, J. (2013). Master data quality barriers: An empirical investigation. *Industrial Management & Data Systems, 113*, 234–249.
Hevner, A., March, S. T., Park, J., & Ram, S. (2004). Design science in information systems research. *MIS Quarterly, 28*, 75–105.
Hicks, B., Culley, S., & Mcmahon, C. (2006). A study of issues relating to information management across engineering SMEs. *International Journal of Information Management, 26*, 267–289.
Hong, D., Suh, E., & Koo, C. (2011). Developing strategies for overcoming barriers to knowledge sharing based on conversational knowledge management: A case study of a financial company. *Expert Systems with Applications, 38*, 14417–14427.
Johannessen, J.-A., & Olsen, B. (2010). The future of value creation and innovations: Aspects of a theory of value creation and innovation in a global knowledge economy. *International Journal of Information Management, 30*, 502–511.
Kembro, J., Näslund, D., & Olhager, J. (2017). Information sharing across multiple supply chain tiers: A Delphi study on antecedents. *International Journal of Production Economics, 193*, 77–86.
Kitchenham, B., & Charters, S. (2007). *Guidelines for performing systematic literature reviews in software engineering. Technical report, Ver. 2.3 EBSE Technical Report.* EBSE. Keele University.
Lemke, F., Clark, M., & Wilson, H. (2011). Customer experience quality: An exploration in business and consumer contexts using repertory grid technique. *Journal of the Academy of Marketing Science, 39*, 846–869.
Lin, C., Wu, J.-C., & Yen, D. C. (2012). Exploring barriers to knowledge flow at different knowledge management maturity stages. *Information & Management, 49*, 10–23.
Lusch, R. F., Vargo, S. L., & Tanniru, M. (2010). Service, value networks and learning. *Journal of the Academy of Marketing Science, 38*, 19–31.
Matook, S., & Indulska, M. (2009). Improving the quality of process reference models: A quality function deployment-based approach. *Decision Support Systems, 47*, 60–71.
Matthyssens, P., & Vandenbempt, K. (2008). Moving from basic offerings to value-added solutions: Strategies, barriers and alignment. *Industrial Marketing Management, 37*, 316–328.
Mayring, P. (2014). *Qualitative content analysis: Theoretical foundation, basic procedures and software solution*.
Merriam, S. B., & Tisdell, E. J. (2009). *Qualitative research: A guide to design and implementation.* John Wiley & Sons.
Ng, I., Scharf, K., Pogrebna, G., & Maull, R. (2015). Contextual variety, Internet-of-Things and the choice of tailoring over platform: Mass customisation strategy in supply chain management. *International Journal of Production Economics, 159*, 76–87.
Nidhra, S., Yanamadala, M., Afzal, W., & Torkar, R. (2013). Knowledge transfer challenges and mitigation strategies in global software development—A systematic literature review and industrial validation. *International Journal of Information Management, 33*, 333–355.
Ojasalo, K., Koskelo, M., & Nousiainen, A. K. (2015). *Foresight and service design boosting dynamic capabilities in service innovation. The Handbook of Service Innovation.* Springer.
Patil, S. K., & Kant, R. (2014). A fuzzy AHP-TOPSIS framework for ranking the solutions of Knowledge Management adoption in Supply Chain to overcome its barriers. *Expert Systems with Applications, 41*, 679–693.
Paulin, D., & Winroth, M. (2013). *Facilitators, inhibitors, and obstacles–A refined categorization regarding barriers for knowledge transfer, sharing, and flow. Proceedings of the 10th International Conference on Intellectual Capital, Knowledge Management and Organisational Learning: ICICKM 2013* Academic Conferences Limited, 320.
Payne, A. F., Storbacka, K., & Frow, P. (2008). Managing the co-creation of value. *Journal of the Academy of Marketing Science, 36*, 83–96.
Peffers, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A design science research methodology for information systems research. *Journal of Management Information Systems, 24*, 45–77.
Pirkkalainen, H., & Pawlowski, J. M. (2014). Global social knowledge management–understanding barriers for global workers utilizing social software. *Computers in Human Behavior, 30*, 637–647.
Qu, S. Q., & Dumay, J. (2011). The qualitative research interview. *Qualitative Research in Accounting & Management, 8*, 238–264.
Ranjan, K. R., & Read, S. (2016). Value co-creation: Concept and measurement. *Journal of the Academy of Marketing Science, 44*, 290–315.
Rehm, S.-V., Goel, L., & Junglas, I. (2016). Information management for innovation networks—An empirical study on the "who, what and how" in networked innovation. *International Journal of Information Management, 36*, 348–359.
Reinhartz-Berger, I., Soffer, P., & Sturm, A. (2010). Extending the adaptability of reference models. *IEEE Transactions on Systems, Man, and Cybernetics-Part A: Systems and Humans, 40*, 1045–1056.
Riege, A. (2007). Actions to overcome knowledge transfer barriers in MNCs. *Journal of Knowledge Management, 11*, 48–67.
Thomas, O. (2005). *Understanding the term reference model in information systems research: History, literature analysis and explanation. International Conference on Business Process Management*. Springer484–496.
Tong, A., Sainsbury, P., & Craig, J. (2007). Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care, 19*, 349–357.
Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management, 14*, 207–222.
Trkman, P., & Desouza, K. C. (2012). Knowledge risks in organizational networks: An exploratory framework. *The Journal of Strategic Information Systems, 21*, 1–17.
Yang, T.-M., & Maxwell, T. A. (2011). Information-sharing in public organizations: A literature review of interpersonal, intra-organizational and inter-organizational success factors. *Government Information Quarterly, 28*, 164–175.
Yin, R. K. (2014). *Case study research: Design and methods* (fifth edition). SAGE publications.
Zahedi, M., Shahin, M., & Babar, M. A. (2016). A systematic review of knowledge sharing challenges and practices in global software development. *International Journal of Information Management, 36*, 995–1019.
Zomerdijk, L. G., & Voss, C. A. (2010). Service design for experience-centric services. *Journal of Service Research, 13*, 67–82.